

## **Exhibit 1**

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*Hawley's*

*Condensed Chemical*

*Dictionary*

**THIRTEENTH EDITION**

*Revised by*

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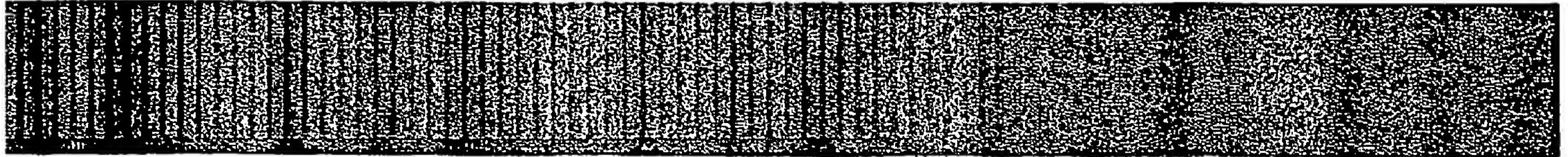


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**"CYTOTEC"**

**Derivation:** Hydrolysis of protein; degradation of cystine. Found in urinary calculi.  
**Available forms:** Available commercially as L(+) -cysteine hydrochloride.  
**Use:** Biochemical and nutrition research, reducing agent in bread doughs (up to 90 ppm).

**cystine.** ( $\beta,\beta'$ -dithiobisalanine; di[ $\alpha$ -amino- $\beta$ -thiolpropionic acid]).  
 CAS: 56-89-3.

$\text{HOOCCH}(\text{NH}_2)\text{CH}_2\text{SSCH}_2\text{CH}(\text{NH}_2)\text{COOH}$ . A nonessential amino acid.

**Properties:** White, crystalline plates. Soluble in water; insoluble in alcohol. Optically active. DL-cystine, mp 260C. D(+) -cystine, mp 247-249C. L(-) -cystine, mp 258-261C with decomposition.

**Derivation:** Hydrolysis of protein (keratin), organic synthesis. Occurs as small hexagonal crystals in urine.

**Grade:** FCC.

**Use:** Biochemical and nutrition research, nutrient and dietary supplement.

**"Cystokon" [Mallinckrodt].** TM for a 30% solution of sodium acetrizoate.

**cythion.** Proprietary malathion.  
**Use:** Insecticide.

**cytidine.**

CAS: 65-46-3.  $\text{C}_9\text{H}_{13}\text{N}_3\text{O}_5$ . The nucleoside consisting of D-ribose and cytosine.

**Properties:** White, crystalline powder. Soluble in water, acid, alkali; insoluble in alcohol.

**Derivation:** From yeast ribonucleic acid. Also available as the hemisulfate,  $(\text{C}_9\text{H}_{13}\text{N}_3\text{O}_5)_2 \cdot \text{H}_2\text{SO}_4$ .

**Use:** Biochemical research.

**cytidine phosphates.** Nucleotides used by the body in growth processes. Important in biochemical and physiological research. Those isolated and commercially available (as sodium salts) are the monophosphate (CMP; see cytidylic acid), diphosphate (CDP), and triphosphate (CTP).

**cytidylic acid.** (cytosolic acid; cytidine phosphoric acid; cytidine monophosphate; CMP).  $\text{C}_{10}\text{H}_{14}\text{N}_3\text{O}_5\text{P}$ . The monophosphoric ester of cytosine, i.e., the nucleotide containing cytosine D-ribose and phosphoric acid. The phosphate may be esterified to the 2, 3, or 5 carbon of ribose, yielding cytidine-2'-phosphate, cytidine-3'-phosphate, or cytidine-5'-phosphate, respectively.

**Properties:** (Cytidine-3'-phosphate) White, crystalline powder; odorless; mild sour taste. Mp: crystals from 50% alcohol 230-233C (with decomposition); crystals from water 227C (with decomposition). Slightly soluble in water and dilute alkalies; insoluble in alcohol and other organic solvents.

**Derivation:** (commercial product) From yeast nucleic acid by hydrolysis. The 5'-monophosphate is

made synthetically by phosphorylation and hydrolysis of isopropylidene cytidine.  
**Use:** Biochemical research.

**cytochemistry.** The branch of biochemistry devoted to study of the chemical composition of cells and cell membranes, including chromosomes, genes, and the complex reactions involved in cell growth and replication, as well as the mechanism of enzyme activity.  
 See molecular biology.

**cytochrome.** A class of iron-porphyrin proteins of great importance in cell metabolism. They are pigments occurring in the cells of nearly all animals and plants. Several types have been identified. Cytochrome carbon is the most abundant and has been obtained in pure forms. The cytochromes and cytochrome oxidase have important functions in cell respiration. The latter is an iron-porphyrin-containing protein that is an important enzyme in cell respiration. It catalyzes the oxidation of cytochrome carbon and is reduced itself in the reaction. It is then reoxidized by oxygen.  
 See porphyrin.

**cytokinins.** See kinin.

**cytoplasm.** The extra nuclear components of the living cell, containing mitochondria, plastids, spherosomes, etc. This, together with the nucleus, constitutes the protoplasm. The chemical constituents are chiefly proteins, plus a high percentage of water.

**"Cytosar" [Upjohn].** TM for cytosine arabinoside.

**cytosine.** (2-oxo-4-aminopyrimidine).  
 CAS: 71-30-7.  $\text{C}_4\text{H}_5\text{N}_3\text{O}$ . A pyrimidine found in both ribonucleic and deoxyribonucleic acids and certain coenzymes.

**Properties:** (Monohydrate) Lustrous platelets. Decomposes at 320-325C. Slightly soluble in water and alcohol; insoluble in ether.

**Derivation:** Isolation following hydrolysis of nucleic acids; organic synthesis.

**Use:** Biochemical research.

**cytosine arabinoside.** (Ara-C; 1- $\beta$ -D-arabinofuranosyl cytosine).

CAS: 147-94-4.  $\text{C}_9\text{H}_{13}\text{N}_3\text{O}_5$ . A drug synthesized in 1969 at Salk Institute. It is useful in combating myelocytic leukemia in adults and has been approved by the FDA as a prescription drug.

**cytosine monophosphate.** See cytidylic acid.

**cytosolic acid.** See cytidylic acid.

**"Cytotec" [Searle].** TM for misoprostol.

**Use:** Drug.

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## THYMOL

odor. D 0.910–0.920, refr index 1.459 (20C), optical rotation –10 to –13 degrees in 100 mm tube. Soluble in alcohol, ether, chloroform, carbon disulfide, fixed oils, and mineral oil. Combustible. Chief known constituents: Dextro-pinene, levofenchone, thujone, should contain more than 60% ketones calculated as thujone. Derivation: Distilled from the leaves of the white cedar, *Thuja occidentalis*. Grade: Technical, FCC (as cedarleaf oil). Use: Perfumery, flavoring.

**thujone.** CAS: 546-80-5.  $C_{10}H_{16}O$ . A terpene-type ketone contained in thuja oil and the oils of sage, tansy, and wormwood. Properties: Colorless liquid. D 0.915–0.919 (20/20C), bp 203C. Insoluble in water; soluble in alcohol. Combustible. Hazard: Toxic by ingestion. Use: Solvent.

**thulia.** See thulium oxide.

**thulium.** Tm. Atomic number 69, group IIIB of the periodic table, a rare-earth element of the lanthanide groups, aw 168.9342, valence of 3; no stable isotopes. Properties: Metallic luster. D 9.318, mp 1550C, bp 1727C. Reacts slowly with water; soluble in dilute acids. Salts colored green. Derivation: Isolated by reduction of the fluoride with calcium. Grade: Regular high purity (ingots, lumps). Hazard: Fire risk in form of dust. Use: Ferrites, X-ray source. See rare earth.

**thulium-170.** Radioactive thulium of mass number 170. Use: X-ray source in portable units.

**thulium chloride.**  $TmCl_3 \cdot 7H_2O$ . Properties: Green, deliquescent crystals. Mp 824C, bp 1440C. Very soluble in water and alcohol.

**thulium oxalate.**  $Tm_2(C_2O_4)_3 \cdot 6H_2O$ . Properties: Greenish-white precipitate, loses  $H_2O$  at 50C. Soluble in aqueous alkali oxalates. Derivation: Precipitation of a solution containing a thulium salt and a mineral acid by addition of oxalic acid. Use: Analytical separation of thulium (and other rare-earth metals) from the common metals.

**thulium oxide.** (thulia).  $Tm_2O_3$ . Properties: Dense white powder with greenish tinge, slightly hygroscopic. Absorbs water and carbon dioxide from the air. D 8.6. Exhibits a reddish incandescence on heating, changing to yellow and then white on prolonged heating. Slowly soluble in strong acids.

Derivation: By ignition of thulium oxalate, salt of other oxyacids, or hydroxide. Grade: 99–99.9%. Use: Source of thulium metal.

**"Thylate" [Du Pont].** TM for a wettable off-white powder containing 65% thiram.

**thymic acid.** See thymol.

**thymidine.** (thymine-2-deoxyriboside). CAS: 50-89-5.  $C_{10}H_{14}N_2O_5$ . The nucleoside (deoxyriboside) of thymine. Occurs in DNA. Properties: Crystalline needles. Mp 185C. Dextrorotatory in solution; soluble in water, methanol, hot ethanol, hot acetone, and hot ethyl acetate; sparingly soluble in hot chloroform; soluble in pyridine and glacial acetic acid. Use: Biochemical research. Also available as trityl thymidine and as tritiated thymidine in a radioactive form.

**thymidylic acid.** The nucleotide of thymine, i.e., the phosphate ester of thymidine.

**thymine.** (5-methyluracil; 5-methyl-2,4-dioxypyrimidine). CAS: 65-71-4.

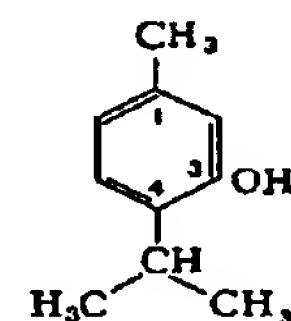


One of the pyrimidine bases of living matter. Properties: White, crystalline powder. Decomposes at 335–337C. Slightly soluble in hot water; insoluble in cold water, alcohol; sparingly soluble in ether; readily soluble in alkalies.

Derivation: Hydrolysis of deoxyribonucleic acid, from methylcyanoacetylurea by catalytic reduction. Use: Biochemical research.

**thymine-2-deoxyriboside.** See thymidine.

**thymol.** (isopropyl-m-cresol; thyme camphor; thymic acid). CAS: 89-83-8.  $(CH_3)_2CHC_6H_3(CH_3)OH$ .



Properties: White crystals; aromatic odor and taste. D 0.979, mp 48–51, bp 233C. Soluble in alcohol, carbon disulfide, chloroform, glacial acetic acid, ether, and fixed or volatile oils; slightly soluble in water and glycerol. Combustible.

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## URYLON

room temperature and are based on chemistry completely different from the traditional adipate polyesters. Available in 25 different variations of glycol base, hydroxyl number, or molecular weight. Use: All forms of polyurethanes made from polyesters, especially those where improved hydrolytic stability and flexibility without external plasticizers are valued.

**Urey, Harold C.** (1894-1981). An American chemist who received the Nobel prize in chemistry in 1934 for his discovery of the heavy isotopes of hydrogen and oxygen. His discovery became an important factor in the development of nuclear fission and fusion and made possible the production of the first transuranic element Pu. He was one of the leaders of the Manhattan Project, which constructed the first nuclear reactor at the University of Chicago and eventually produced the first atomic bomb. Obtaining his doctorate at the University of California in 1923, he taught at several leading universities, including Columbia, where he discovered deuterium D oxide (heavy water), used as a moderator in early types of nuclear reactors. Later he devoted much study to the origin of the universe and the origin of life on earth. He was the author of many scientific treatises and made notable contributions to the cosmological theories.

**uric acid.** (lithic acid; uric oxide; 2,6,8-trioxopurine).

CAS: 69-93-2.



May also be written in enolic form. The end product of purine metabolism in human and other primates, birds, and some dogs and reptiles.

Properties: Odorless, white crystals; tasteless. D 1.855-1.893, mp (decomposes). Soluble in hot concentrated sulfuric acid; very slightly soluble in water; insoluble in alcohol and ether; soluble in glycerol, solutions of alkali hydroxides, sodium acetate, and sodium phosphate.

Derivation: From guano.

Grade: Technical, reagent.

Hazard: Evolves highly toxic hydrogen cyanide when heated.

Use: Organic synthesis.

See pyrine.

**uridine.** (D-ribosyl uracil).

CAS: 58-96-8.  $\text{C}_9\text{H}_{12}\text{N}_2\text{O}_6$ . The nucleoside of uracil. It is a constituent of ribonucleic acid and some coenzymes (such as uridine diphosphate glucose).

Properties: White powder; odorless; slightly acidic and faintly sweet taste. Mp 165C. Soluble in water; slightly soluble in dilute alcohol; insoluble in strong alcohol.

Derivation: From nucleic acid hydrolyzates from yeast. Radioactive forms available.

Use: Biochemical research.

**uridine diphosphate glucose.** (UDPG). A coenzyme that acts in the transfer of glucose from the coenzyme to another chemical compound during the reaction for which the coenzyme is a catalyst.

Use: Biochemical research.

**uridine monophosphate.** See uridylic acid.

**uridine phosphate.** A nucleotide used by the body in growth processes; important in biochemical and physiological research. Those isolated and commercially available (as sodium salts) are the monophosphate (UMP), the diphosphate (UDP), and the triphosphate (UTP).

See uridine diphosphate glucose (UDPG).

**uridylic acid.** (uridine phosphoric acid; UMP; uridine monophosphate).

CAS: (5') 58-97-9. ( $\text{C}_9\text{H}_{13}\text{N}_2\text{O}_9\text{P}$ ). The monophosphoric ester of uracil, i.e., the nucleotide containing uracil-D-ribose and phosphoric acid. The phosphate may be esterified to either the 2, 3, or 5 carbon of ribose, yielding uridine-2'-phosphate, uridine-3'-phosphate, and uridine-5'-phosphate, respectively.

Properties: (Uridine-3'-phosphate) Crystallizes in prisms from methanol. Mp 202C (decomposes). Freely soluble in water and alcohol; dextrorotatory in solution.

Derivation: (of commercial product) From yeast ribonucleic acid. Also made synthetically; radioactive forms available.

Use: Biochemical research.

**uroforamine.** (urotropin, formin, crystogen, cystamine).

See hexamethyltetramine.

**uronic acid.** Any of a class of compounds similar to sugars but differing from them in that the terminal carbon has been oxidized from an alcohol to a carboxyl group. The most common are galacturonic acid and glucuronic acid.

**ursin.** See arbutin.

**urushiol.** Mixture of catechol derivatives.

Properties: Pale-yellow liquid. D 0.968, bp 200C. Soluble in alcohol, ether, and benzene.

Derivation: Poison ivy (*Rhus toxicodendron*).

Hazard: The toxic principle of poison ivy. Causes severe allergic dermatitis.

**urylon.** A polyurea synthetic fiber made by condensation of nonamethylenediamine and urea.

Properties: D 1.07, softening p 205C, mp 235C, weakens on heating to 150C or long exposure to light.

Use: Fiber blends, fishing gear, and the like.

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